



# NMDCAT

## FINAL SESSION PAPER-3

Total MCQs: 200

Max. Marks: 200

### BIOLOGY

- Q.1** In primary cell wall, the one which is arranged in criss cross manner is:  
 a. Cellulose  
 b. Hemicellulose  
 c. Pectin  
 d. Lignin
- Q.2** Which of the following structure is involved in oxidative phosphorylation?  
 a. Mitochondrial matrix  
 b. Inner mitochondrial membrane  
 c. Outer mitochondrial membrane  
 d. Thylakoid membrane
- Q.3** It is an example of semi-autonomous organelle found in both plant and animal cells:  
 a. Mitochondria  
 b. Golgi Apparatus  
 c. Ribosomes  
 d. Chloroplast
- Q.4** The precursors of ribosomal sub-units are located in/at:  
 a. RER  
 b. Cytoplasm  
 c. Peripheral area of nucleolus  
 d. Center of Nucleolus
- Q.5** All of the following types of transports require energy for the transport of material to pass through cell membrane except:  
 a. Along concentration gradient  
 b. Against concentration gradient  
 c. Phagocytosis  
 d. Pinocytosis
- Q.6** The following table gives the description of membranous structures found in a eukaryotic cell. Which structure is correctly matched to its function?

|    | Function            | Structure  |
|----|---------------------|--|
| a. | Packing of proteins | An organelle bounded by two membranes, the inner highly folded                 |
| b. | Aerobic respiration | A network of tubes and sacs, each tube and sac surrounded by a single membrane |
| c. | Autophagy           | An organelle bounded by one membrane, containing hydrolytic enzymes            |
| d. | Lipid synthesis     | A stack of elongated, curved sacs, each sac surrounded by a single membrane    |

- Q.7** The percentage of DNA in mammalian cell to total cellular weight is:  
 a. 4%  
 b. 3 %  
 c. 1.1%  
 d. 0.25%
- Q.8** Which of the following is an example of keto-sugar?  
 a. Glyceraldehyde  
 b. Dihydroxyacetone  
 c. Ribose  
 d. Glucose
- Q.9** Lipids contain double amount of energy as compared to the same amount of carbohydrates due to the presence of:  
 a. Lower proportion of C-H bonds  
 b. Higher proportion of C-H bonds  
 c. Higher proportion of C-O bonds  
 d. Higher proportion of oxygen
- Q.10** Which one of the following carbon in keto sugars is devoid of OH group?  
 a. Carbon 1  
 b. Carbon 2  
 c. Carbon 3  
 d. Both carbon 1 and 3
- Q.11** The structure of a fibrous protein comprises of polypeptide chains in the form of:  
 a. Cluster  
 b. Flat uncoiled chains  
 c. Spherical or curled up ball  
 d. Long strands or fibrils
- Q.12** All of the following are subunits of DNA nucleotides except:  
 a. Deoxyribose sugar  
 c. Nitrogenous base  
 b. Phosphate group  
 d. Choline
- Q.13** The active site of an enzyme consist of \_\_\_\_\_ regions.  
 A. 1  
 B. 2  
 C. 3  
 d. 0



- Q.14 It is the product of succinic dehydrogenase catalyzed reaction:  
a. Succinic acid  
**c. Fumaric acid**  
b. Malonic acid  
d. Citric acid
- Q.15 They act as a bridge between enzyme and substrate:  
A. Active Site  
C. Reversible Inhibitors  
b. Irreversible Inhibitors  
**d. Co-factor**
- Q.16 It acts as a chemical linkage between catabolism and anabolism:  
a. FADH<sub>2</sub>  
c. Cytochromes  
b. NAD<sup>+</sup>  
**d. ATP**
- Q.17 Nitrogen is present in \_\_\_\_\_ of chlorophyll molecule.  
**a. Hydrophilic region**  
c. Phytol  
b. Tail portion  
d. Hydrophobic end
- Q.18 Functional group of chlorophyll a molecule that is different from chlorophyll b is:  
**a. -CH<sub>3</sub>**  
c. -COOH  
b. -CHO  
d. -OH
- Q.19 How many photons are required to excite one electron from chlorophyll molecule?  
**a. 1**  
c. 3  
b. 2  
d. 4
- Q.20 Which process of cellular respiration generates more number of reduced NAD?  
a. Glycolysis  
**c. Krebs cycle**  
b. Link reaction  
d. Oxidative phosphorylation
- Q.21 Both ATP production and consumption is the feature of only:  
**a. Glycolysis**  
c. Link reaction  
b. Krebs cycle  
d. Electron transport chain
- Q.22 The fate of pyruvic acid depends upon:  
**a. Availability of O<sub>2</sub>**  
c. Presence of enzymes  
b. Energy status of the cell  
d. Presence of anti-metabolites
- Q.23 First vaccine in the world was developed against:  
**a. Viral Disease**  
c. Fungal Disease  
b. Bacterial disease  
d. Protozoan disease
- Q.24 Host biosynthetic machinery forms all components of phages under phage genomic information except:  
**a. DNAs**  
**c. Envelope of phages**  
b. Tail proteins  
d. Capsid proteins
- Q.25 Viruses associated with tumor production in fowl, rodents and cats are:  
a. Paramyxovirus  
**c. Retroviruses**  
b. Pox virus  
d. Parvovirus
- Q.26 Mode of reproduction in viruses is:  
a. Conjugation  
c. Binary fission  
**b. Replication**  
d. Transformation
- Q.27 Fimbriae are usually:  
a. Hair like thin appendages  
c. Made up of flagellin protein  
b. Cell wall extensions in bacteria  
**d. Hollow filamentous appendage**
- Q.28 Least amount of peptidoglycan is present in \_\_\_\_\_ but absent in \_\_\_\_\_.  
a. Gram positive bacteria, Archaeobacteria  
**c. Gram negative bacteria, Mycoplasma**  
b. Archaeobacteria, Mycoplasma  
d. Mycoplasma, Archaeobacteria
- Q.29 The hyphae of all fungi are usually \_\_\_\_\_.  
A. Diploid  
C. Triploid  
**b. Haploid**  
d. Polyploid
- Q.30 Bryophytes are known as Amphibians of plants because they:  
a. Have no vascular tissues  
c. Have dominant gametophyte  
b. Can grow at damp shady places  
**d. Need water for reproduction**
- Q.31 Enterocoelous coelom formation is the characteristic of all except?  
**a. Arthropoda**  
c. Hemichordata  
b. Echinodermata  
d. Chordata



- Q.32 Insectivorous plants obtained \_\_\_\_\_ by digesting the animal body.  
a. Carbohydrates  
b. Glycolipids  
c. Lipids  
d. Nitrogenous compounds
- Q.33 The cell wall of epidermal cells of roots is \_\_\_\_\_ to water and other minerals.  
a. Differentially permeable  
b. Partially permeable  
c. Freely permeable  
d. Semi permeable
- Q.34 The minerals move down their concentration gradient through plasmodesmata follow the pathway of:  
a. Pericycle, cortex, endodermis, sap in phloem  
b. Pericycle, endodermis, cortex, sap in phloem  
c. Cortex, pericycle, endodermis, sap in xylem  
d. Cortex, endodermis, pericycle, sap in xylem
- Q.35 The casparian strips separate the extracellular space in the \_\_\_\_\_ into two compartments.  
a. Epidermis  
b. Endodermis  
c. Mesophyll  
d. Cortex
- Q.36 The correct pathway of passage of lymph is:  
a. Interstitial fluid → lymph vessel → lymph capillaries → lymph node  
b. Interstitial fluid → lymph node → lymph vessel → lymph capillaries  
c. Interstitial fluid → lymph capillaries → lymph node → lymph vessels  
d. Interstitial fluid → lymph vessel → lymph node → lymph capillaries
- Q.37 Which one of the following layer of arteries enable them to tolerate high blood pressure?  
a. Epithelium  
b. Middle Muscular  
c. Inner endothelium  
d. Oblique Muscles
- Q.38 Exchange of material occur at:  
a. Venules & capillaries  
b. Arterioles & capillaries  
c. Capillaries only  
d. Venules & arterioles
- Q.39 Which is not the function of lymphatic system?  
a. Absorption of material from lymph  
b. Absorption of digested fats  
c. Defend against diseases  
d. Transport lymph to circulatory system
- Q.40 The removal of metabolic wastes from the blood is called:  
a. Thermoregulation  
b. Osmoregulation  
c. Kidney Failure  
d. Excretion
- Q.41 A central cavity of the kidney where urine is collected after filtration is known as:  
a. Ureter  
b. Pelvis  
c. Urethra  
d. Urinary Bladder
- Q.42 Reabsorption of water by counter current multiplier mechanism takes place at:  
a. Proximal Tubule  
b. Distal Tubule  
c. Collecting Duct  
d. Loop of Henle
- Q.43 A larger quantity of dilute urine is produced in diabetes insipidus. This disease is due to the deficiency of:  
a. Antidiuretic hormone  
b. Aldosterone  
c. Thyroxine  
d. Cortisol
- Q.44 Which one of the following is not an endotherm?  
a. Birds  
b. Flying insects  
c. Mammals  
d. Amphibians
- Q.45 The skeletal muscles always appear regularly striated due to:  
a. Alternate arrangement of light and dark band  
b. Irregular arrangement of light and dark band  
c. Sarcomere  
d. Myofibril
- Q.46 Troponin has binding sites for all of these except:  
a. Myosin  
b. Actin  
c. Tropomyosin  
d. Calcium
- Q.47 During muscles relaxation, the calcium ions are:  
a. Released from sarcoplasmic reticulum in to sarcoplasm  
b. Forced back from sarcoplasm to sarcoplasmic reticulum  
c. Further forced from sarcoplasmic reticulum into sarcoplasm  
d. Neither released more nor forced back but remains constant



**Q.48** Identify the correct option with respect to the direction of conduction of nerve impulses by cytoplasmic processes of neurons:

|           | Dendron             | Axon                |
|-----------|---------------------|---------------------|
| a.        | Away from cell body | Away from cell body |
| <b>b.</b> | Towards cell body   | Away from cell body |
| c.        | Towards cell body   | Towards cell body   |
| d.        | Away from cell body | Towards cell body   |

**Q.49** The hyperpolarized neurolemma is brought back to polarized state due to the activity of:

- a. Closing of  $K^+$  gates  
b. Closing of  $Na^+$  gates  
c. Opening of  $K^+$  gates  
**d. Na-K pump**

**Q.50** Nervous coordination consists of how many elements?

- a. 1  
**b. 3**  
c. 2  
d. 5

**Q.51** The androgens are secreted from?

- a. Anterior pituitary  
**b. Adrenal cortex**  
c. Adrenal medulla  
d. Thyroid gland

**Q.52** Increase production of parthormone may lead to?

- a. Kidney stone**  
b. Tetany  
c. Diabetes insipidus  
d. Cretinism

**Q.53** Secretory phase of uterine cycle coincide with which one of the following phase of ovarian cycle?

- a. Follicular phase  
**b. Ovulatory phase**  
c. Luteal phase  
d. Menstrual phase

**Q.54** Which one of the following is serves as temporary endocrine gland?

- a. Follicle cell  
**b. Oogonium**  
c. Corpus luteum  
d. Primary oocyte

**Q.55** After ovulation, secondary oocyte enters into:

- a. Ovary  
**b. Oviduct**  
c. Cervix  
d. Corpus luteum

**Q.56** All the genes found in a breeding population at a given time are collectively termed as:

- a. Gene cluster  
**b. Gene pool**  
c. Gene frequency  
d. Gene linkage

**Q.57** \_\_\_\_\_ is the form of appearance of a trait while \_\_\_\_\_ is the genetic complement of an organism, respectively.

- a. Karyotype, genotype  
**b. Genotype, phenotype**  
c. Phenotype, genotype  
d. Phenotype, karyotype

**Q.58** G. Mendel selected *P. sativum* as experimental plant because:

- a. It is easy to cultivate  
b. It has short generation time  
c. It can be self-fertilized or cross fertilized  
**d. All a, b, c**

**Q.59** From the following options, pick the one that best depicts the phenotypic and genotypic ratios of Mendelian crosses regarding law of segregation:

- a. 1:2:1 and 3:1 respectively  
**b. 3:1 and 1:2:1 respectively**  
c. 9:3:3:1 and 1:2:1 respectively  
d. 3:1 and 9:3:3:1 respectively

**Q.60** What is the percentage of homozygous round in round green phenotypic combination in Mendel's dihybrid cross?

- a. 33.3%**  
b. 66.6%  
c. 25%  
d. 75%

**Q.61** Crossing over has direct relation with all of the following factors except:

- a. Gene linkage**  
b. Variations  
c. Distance  
d. Recombinant frequency

**Q.62** Gene for albinism in man is present on chromosome number:

- a. 11**  
b. 18  
c. 21  
d. X-chromosome

**Q.63** Chromosomes are composed of \_\_\_\_\_ and \_\_\_\_\_, respectively.

- a. 60% DNA and 40% proteins  
**b. Equal amount of DNA and proteins**  
c. 40% DNA and 60% proteins  
d. 10% DNA, 30% proteins, and 60% RNA

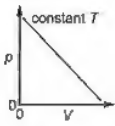




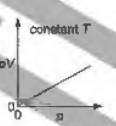
- Q.64 A. Hershey and M. Chase used labeled bacteriophages with radio isotopes of  $P^{32}$  and  $S^{35}$ .  $P^{32}$  was incorporated in which one of the following part of viruses?  
a. Capsid  
b. Tail  
c. Tail fibers  
d. DNA
- Q.65 Secondary structure of DNA is due to?  
a. Phosphodiester bond  
b. Hydrogen bond  
c. Ester bond  
d. Nucleosome
- Q.66 The process of replication of DNA in eukaryotes begins at:  
a. One place only without any specific sequence of DNA  
b. One or more places without any specific sequence of DNA  
c. Any place with the uncoiling of two strands of DNA  
d. One or more places where there is a specific sequence of nucleotide
- Q.67 It is the product of primase during DNA replication:  
a. DNA in nature  
b. DNA-RNA hybrid  
c. RNA in nature  
d. inucleotide
- Q.68 Which one of the following step of central dogma in both prokaryotes and eukaryotes has common site?  
a. Transcription  
b. Post-transcriptional modification  
c. Translation  
d. Replication
- Q.69 Which one of the following is the direction of template strand during transcription?  
a. 5' to 5'  
b. 5' to 3'  
c. 3' to 5'  
d. 3' to 3'
- Q.70 A student of biotechnology has extracted a protein from rapidly dividing hemopoietic stem cell which is found to be consists of 152 amino acids. He would be expecting \_\_\_\_\_ length of mature mRNA of this protein with one stop codon.  
a. 152 nucleotides  
b. 459 nucleotides  
c. 153 nucleotides  
d. 456 nucleotides
- Q.71 The ability of individuals to survive and reproduce will lead to a gradual change in a population, with favourable characteristics accumulating over the generations, thus leading to \_\_\_\_\_.  
a. Survival of best fit individual  
b. Inheritance of acquired characters  
c. Natural Selection  
d. Evolution of new species
- Q.72 Which one of the following is polyphyletic?  
a. Homologous organs  
b. Analogous organs  
c. Divergent evolution  
d. Membrane invagination Hypothesis
- Q.73 Which one of the following is considered visual evidence of evolution?  
a. Biogeography  
b. Comparative anatomy  
c. Embryology  
d. Fossils
- Q.74 If you are provided with HIV for genetic engineering, then which one of the following is best way to obtained gene of interest?  
a. To isolate it from the chromosome  
b. Reverse transcription  
c. Chemically synthesize in laboratory  
d. Artificially synthesized
- Q.75 All of the following have palindromic sequences except:  
a. Gene of interest  
b. Restriction Endonuclease  
c. Plasmids  
d. Lambda phage
- Q.76 During PCR process Taq polymerase works at which one of the following stage:  
a. Denaturation  
b. Extension  
c. Annealing  
d. Cooling
- Q.77 All of the following can be utilized during RFLP's DNA analysis except:  
a. Restriction Endonucleases  
b. Gel Electrophoresis  
c. PCR amplification  
d. Ligase
- Q.78 Which one of the following is not related to PCR?  
a. Amplification of DNA  
b. Use to obtain protein  
c. In vitro method  
d. Quick method
- Q.79 A technique in transgenic animals in which desired gene is inserted into the eggs of animal is called:  
a. Embryonic stem cell mediated transfer  
b. Microinjection  
c. Retro-virus mediated gene transfer  
d. Virus vectors
- Q.80 A method used to detect a particular DNA sequence within a mixture of many DNA fragments is:  
a. DNA sequencing  
b. DNA fingerprinting  
c. DNA hybridization  
d. Gel electrophoresis

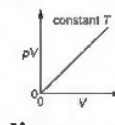


## CHEMISTRY

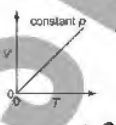
- Q.81** Gaseous sulfur dioxide  $\text{SO}_2$ , can be removed from smokestacks by treatment with limestone and oxygen.  $2\text{SO}_2(\text{g}) + 2\text{CaCO}_3(\text{s}) + \text{O}_2(\text{g}) \rightarrow 2\text{CaSO}_4(\text{s}) + 2\text{CO}_2(\text{g})$   
How many grams of  $\text{CaCO}_3$  are required to remove 192g of  $\text{SO}_2$ ?  
a. 300 g      b. 234 g  
c. 150g      d. 468 g
- Q.82** 50g of  $\text{CaCO}_3$  decomposes to form 11g. What is percentage efficiency of this reaction  
a. 25      b. 50  
c. 75      d. 40
- Q.83** How many neutrons are present in 0.14g of  $^{14}_7\text{N}$   
a.  $0.06 N_A$       b.  $0.13 N_A$   
c.  $0.07 N_A$       d.  $0.7 N_A$
- Q.84** What volume of  $\text{NH}_3$  is produced on reacting  $20\text{cm}^3$  of  $\text{N}_2$  and  $80\text{cm}^3$  of  $\text{H}_2$   
a.  $80\text{cm}^3$       b.  $100\text{cm}^3$   
c.  $40\text{cm}^3$       d.  $20\text{cm}^3$
- Q.85** Which diagram correctly describes the behaviour of a fixed mass of an ideal gas? (T is measured in K.)
- 

a.



b.
- 

c.



d.
- Q.86** Helium gas is compressed to half of the volume at 303K. It should be heated to which temperature to obtain original volume  
a. 303K      b. 1212K  
c. 606K      d.  $30^\circ\text{C}$
- Q.87** Boiling points of different substances are given below  
 $\text{CH}_4 = -161^\circ\text{C}$        $\text{C}_2\text{H}_6 = -89^\circ\text{C}$        $\text{Cl}_2 = -34.6^\circ\text{C}$        $\text{F}_2 = -188^\circ\text{C}$   
 The data shows that vapour pressure is of the order  
 a.  $\text{Cl}_2 > \text{C}_2\text{H}_6 > \text{CH}_4 > \text{F}_2$       b.  $\text{Cl}_2 > \text{F}_2 > \text{CH}_4 > \text{C}_2\text{H}_6$   
 c.  $\text{C}_2\text{H}_6 > \text{CH}_4 > \text{F}_2 > \text{Cl}_2$       d.  $\text{F}_2 > \text{CH}_4 > \text{C}_2\text{H}_6 > \text{Cl}_2$
- Q.88** The number of vacant orbitals in the valence shell of an atom of element with  $Z=14$  is  
a. 1      b. 5  
c. 7      d. 6
- Q.89** Which of the following have same number of neutrons as in  $^{76}_{32}\text{Ge}$   
a.  $^{77}_{32}\text{Ge}$       b.  $^{77}_{34}\text{Se}$   
c.  $^{77}_{33}\text{As}$       d.  $^{76}_{34}\text{Se}$
- Q.90** When two lone pairs and two bond pairs are around the central atom, decrease in the bond angle is up to  
a.  $109.5^\circ$       b.  $102^\circ$   
c.  $104.5^\circ$       d.  $107.5^\circ$
- Q.91** Which of the following have least bond angle?  
a.  $\text{NF}_3$       c.  $\text{BF}_3$   
b.  $\text{NH}_3$       d.  $\text{H}_2\text{S}$
- Q.92** The units of active mass of a substance in reaction is  
a. moles      b.  $\text{mol}\cdot\text{dm}^{-3}$   
c.  $(\text{moles})^2$       d.  $\text{mol}\cdot\text{dm}^{-3}\cdot\text{s}^{-1}$
- Q.93** As a result of the reaction of a small amount of material, there is a large increase in the temperature of the water in a calorimeter. What is the  $\Delta H$  for the reaction?  
a. Large and negative      b. Small and negative  
c. Large and positive      d. Small and positive



- Q.94 The product obtained at the anode during the electrolysis of an aq.  $\text{H}_2\text{SO}_4$  is  
 a. Hydrogen  
 c. Oxygen  
 b. Sulphur dioxide  
 d. No product is formed
- Q.95 Non-typical transition elements of d-block belongs to \_\_\_\_\_ and \_\_\_\_\_ group  
 a. IB, IIB  
 c. IIB, IIIB  
 b. IB, IIIB  
 d. IIIB, IVB
- Q.96 The least soluble compound (salt) of the following  
 a.  $\text{MgCO}_3$  ( $K_{sp} = 1.9 \times 10^{-4}$ )  
 c.  $\text{PbSO}_4$  ( $K_{sp} = 1.3 \times 10^{-8}$ )  
 b.  $\text{CaF}_2$  ( $K_{sp} = 2.0 \times 10^{-4}$ )  
 d.  $\text{Ca}(\text{OH})_2$  ( $K_{sp} = 1.17 \times 10^{-2}$ )
- Q.97 For the reaction  $2\text{HI} \rightleftharpoons \text{H}_2 + \text{I}_2$ , the equilibrium constant remains unchanged by all except  
 a. Catalyst  
 c. Volume  
 b. Temperature  
 d. Pressure
- Q.98 Which of the following is correct about given reaction?  
 $\text{C}_2\text{O}_4^{2-} \longrightarrow 2\text{CO}_2$   
 a.  $2e^-$  on LHS  
 c.  $2e^-$  on RHS  
 b.  $4e^-$  on LHS  
 d.  $4e^-$  on RHS
- Q.99 75% of a first order reaction was completed in 32 min-When was 50% of the reaction completed  
 a. 24 min  
 c. 16min  
 b. 4 min  
 d. 8 min
- Q.100 In which pair is the radius of the second atom greater than that of the first atom  
 a. Na, Mg  
 c. Sr, Ca  
 b. P, N  
 d. Cl, Br
- Q.101 The ionization energies for element X are listed in the table below. On the basis of the data, element X is most likely to be
- | Ionization Energies for element X ( $\text{kJ mol}^{-1}$ ) |        |       |        |        |
|--|--------|-------|--------|--------|
| First  | Second | Third | Fourth | Fifth  |
| 580  | 1,815  | 2,740 | 11,600 | 14,800 |
- a. Mg  
 c. Al  
 b. Si  
 d. P
- Q.102 Which of the following property increases in group as well as in period (upto group IIIA)  
 a. Electrical conductance  
 c. Atomic size  
 b. Melting point  
 d. Electron affinity
- Q.103 Which element does not produce color during flame test  
 a. Ba  
 c. K  
 b. Na  
 d. Zn
- Q.104 Which element is not added into iron for formation of steel  
 a. Cr  
 c. Na  
 b. Mn  
 d. Ni
- Q.105 Hydrohalogenation of alkene proceed through \_\_\_\_\_ mechanism  
 a. Nucleophilic addition reaction  
 c. Free radical addition  
 b. Electrophilic addition reaction  
 d. Electrophilic substitution reaction
- Q.106 Proteins can be denatured by  
 a. Adding acid or base  
 c. Heating at high temperature  
 b. Using U.V rays  
 d. All of these
- Q.107 Enzymes can increase the rate of reaction by factor  
 a.  $10^{10}$   
 c.  $10^{30}$   
 b.  $10^{20}$   
 d.  $10^{40}$
- Q.108 Which metal produces brilliant white flash when burnt to form a powdered product  
 a. Mg  
 c. Zn  
 b. Ca  
 d. K
- Q.109 In which of the following pair first compound have greater lattice energy then other  
 a. NaCl, NaF  
 c. BaO, MgO  
 b. CaO, BaO  
 d. LiI, LiF



- Q.110 Which of the following aldehyde can show functional group isomerism with ketones  
 a. HCHO  
 b. CH<sub>3</sub>CHO  
 c. CH<sub>3</sub>CH<sub>2</sub>COOH  
 d. CH<sub>3</sub>CH<sub>2</sub>CHO
- Q.111 In the following, which one is free radical  
 a. Cl<sup>-</sup>  
 b. Cl<sub>2</sub>  
 c. Cl<sup>+</sup>  
 d. Cl
- Q.112 Which is correct about carbon monoxide and carbon dioxide?  
 a. Both are polar  
 b. Both are basic  
 c. Both have sp-hybridized carbon  
 d. Both contain four lone pairs
- Q.113 How many hydrogen atoms are present in the molecule of 3-methyl octane  
 a. Eighteen  
 b. Nineteen  
 c. Twenty  
 d. Twenty-one
- Q.114 Carboxylic acid exist in the form of cyclic dimer in non-polar solvent like benzene. How many atoms of oxygen are present in the ring of dimer?  
 a. 2  
 b. 4  
 c. 6  
 d. 8
- Q.115 At 100°C and 60% conc. H<sub>2</sub>SO<sub>4</sub>, the alkene produced by dehydration of isopropyl alcohol will be  
 a. Ethene  
 b. Propene  
 c. Propyne  
 d. Ethyne
- Q.116 Benzene  $\xrightarrow[\text{AlCl}_3]{\text{CH}_3\text{CH}_2\text{Cl}}$  R, Here 'R' is  
 a. Toluene  
 b. Xylene  
 c. Ethyl benzene  
 d. Chlorobenzene
- Q.117 Neo pentyl halide is an example of \_\_\_\_\_ alkyl halide  
 a. Primary  
 b. Secondary  
 c. Tertiary  
 d. Quaternary
- Q.118 A bromine-containing organic compound, T, undergoes an elimination reaction when treated with alcoholic KOH solution. What is T?  
 a. CH<sub>3</sub>Br  
 b. (CH<sub>3</sub>)<sub>2</sub>C=CBr<sub>2</sub>  
 c. C<sub>2</sub>Br<sub>6</sub>  
 d. CH<sub>3</sub>CH<sub>2</sub>CBr<sub>3</sub>
- Q.119 Which reaction proceeds only by an S<sub>N</sub>1 mechanism  
 a. CH<sub>3</sub>CH<sub>2</sub>Br + NH<sub>3</sub>  
 b. CH<sub>3</sub>CHBrCH<sub>3</sub> + NH<sub>3</sub>  
 c. CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>I + OH<sup>-</sup>  
 d. (CH<sub>3</sub>)<sub>3</sub>CCl + OH<sup>-</sup>
- Q.120 Which of the following is most ionic compound  
 a. MCl  
 b. MCl<sub>2</sub>  
 c. MCl<sub>3</sub>  
 d. MCl<sub>4</sub>
- Q.121 The reaction, CH<sub>2</sub>=CH<sub>2</sub> + H<sub>2</sub>  $\xrightarrow[\text{Ni-300}^\circ\text{C}]{} \text{CH}_3\text{CH}_3$   
 a. Nucleophilic addition reaction  
 b. Reduction reaction  
 c. Dehydrogenation  
 d. Halogenation
- Q.122 Primary and secondary alcohols can be distinguished by  
 a. Baeyer's test  
 b. Bromine water test  
 c. Tollen's test  
 d. Lucas test
- Q.123 Which of the following does not give iodoform test  
 a. CH<sub>3</sub>COCH<sub>3</sub>  
 b. C<sub>6</sub>H<sub>5</sub>COCH<sub>3</sub>  
 c. CH<sub>3</sub>CHO  
 d. HCHO
- Q.124 Consider the following reaction 2HCHO + NaOH → CH<sub>3</sub>OH + HCOONa  
 a. Nucleophilic substitution reaction  
 b. Electrophilic substitution reaction  
 c. Elimination substitution reaction  
 d. Disproportionation reaction
- Q.125 Which one of the following is least reactive  
 a. Nitro benzene  
 b. Benzoic acid  
 c. Phenol  
 d. Chloro benzene
- Q.126 In the presence of electrophile least reactive alcohol is  
 a. 1-Butanol  
 b. 1-Propanol  
 c. 1-Propanol  
 d. 1-Pentanol





Q.127 Which of the following is fast reaction?

- (I)  $\text{CH}_3\text{COOH} + \text{C}_2\text{H}_5\text{OH} \rightarrow \text{CH}_3\text{COOC}_2\text{H}_5 + \text{H}_2\text{O}$   
 (II)  $\text{C}_{12}\text{H}_{22}\text{O}_{11} + \text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + \text{C}_6\text{H}_{12}\text{O}_6$   
 (III)  $\text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{H}_2\text{O}$

- a. I only  
 b. II only  
 c. III only  
 d. I and III only

Q.128 What is formed when propanone is refluxed with a solution of  $\text{NaBH}_4$ ?

- a. Propanal  
 b. Propan-2-ol  
 c. Propan-1-ol  
 d. Propane

Q.129 Which of the following contain  $\text{Cu}^{+2}$  citrate complex ions in basic medium?

- a. Benedict's solution  
 b. Fehling's solution  
 c. Tollen's solution  
 d. All of these

Q.130 The product of the reaction between propanone and hydrogen cyanide is hydrolyzed under acidic conditions. What is the formula of the final product?

- a.  $\text{CH}_3\text{CH}(\text{OH})\text{CO}_2\text{H}$   
 b.  $(\text{CH}_3)_2\text{CHCONH}_2$   
 c.  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CO}_2\text{H}$   
 d.  $(\text{CH}_3)_2\text{C}(\text{OH})\text{CO}_2\text{H}$

Q.131 Which ester is formed when the alcohol  $\text{CH}_3\text{CH}_2\text{OH}$  is reacted with  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CO}_2\text{H}$ ?

- a. Ethyl propanoate  
 b. Propyl ethanoate  
 c. Ethyl butanoate  
 d. Butyl ethanoate

Q.132 Which of the following is the weakest acid?

- a.  $\text{H}-\text{C}(=\text{O})-\text{OH}$   
 b.   
 c.  $\text{H}_3\text{C}-\text{C}(=\text{O})-\text{OH}$   
 d. 

Q.133  $\text{A} \xrightarrow[\text{H}_2\text{SO}_4]{\text{K}_2\text{Cr}_2\text{O}_7} \text{B} \xrightarrow[\text{H}_2\text{SO}_4]{\text{K}_2\text{Cr}_2\text{O}_7} \text{CH}_3-\text{C}(=\text{O})-\text{OH} + \text{HCOOH}$  What is A

- a. Isopropyl alcohol  
 b. Acetone  
 c. Propanal  
 d. n-propanol

Q.134 Carboxylic acids can be reduced by using  $\text{LiAlH}_4$ . Which of the following will be formed by the reduction with  $\text{LiAlH}_4$ ?

- a. Primary alcohols  
 b. Secondary alcohols  
 c. Ketones  
 d. Alkane

Q.135 Amyl acetate is an ester used for artificial flavoring of food. Reactants for amyl acetate are

- a. Ethanol + Pentanoic acid  
 b. Pentanol + Ethanoic acid  
 c. Valeric acid + Ethyl alcohol  
 d. Isobutyl alcohol + Ethanoic acid

Q.136 Hydrolysis of acetamide in presence of acidic media produce

- a. Acid + Base  
 b. Base + Salt  
 c. Acid + Acid  
 d. Acid + Salt

Q.137 Which of the following acid can be used to produce ester by reacting either with alcohol or another carboxylic acid

- a. Acetic acid  
 b. Valeric acid  
 c. Lactic acid  
 d. Glutamic acid

Q.138 Correct order of reactivity for an electrophilic attack is

- a. Alkane < alkene < alkyne  
 b. Alkane > alkene < alkyne  
 c. Alkyne < alkene < alkane  
 d. Alkyne > alkane < alkene

Q.139 Which of the following intermediate of benzene is formed in electrophilic substitution reaction

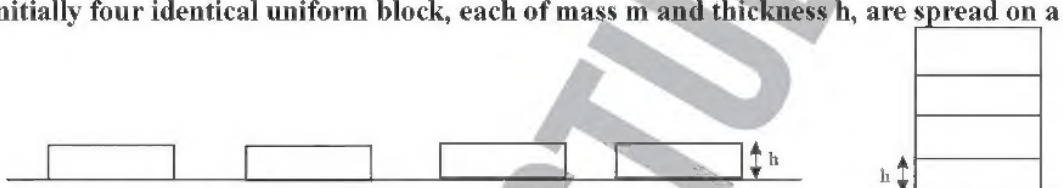
- a. Benzyl radical  
 b. Nitronium ion  
 c. Benzononium ion  
 d. Carbanion

Q.140 Which one of the following statements apply to all three of the compounds ethane, ethene and ethyne?

- a. They all occur in crude oil  
 b. One mole of each contains the same number of carbon atoms  
 c. They are member of the same homologous series  
 d. They all have same chemical properties

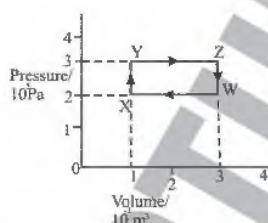


## PHYSICS

- Q.141** Hassan and Umar are standing face to face on ice wearing ice skates. If Hassan apply a force of 10N on Umar (assume no other opposing force exists) what is the acceleration produce in Umar (If mass of Umar is 80 kg and Hassan is 50 kg)
- a.  $0.125 \text{ ms}^{-2}$       b.  $0.2 \text{ ms}^{-2}$   
c.  $-0.2 \text{ ms}^{-2}$       d.  $-0.125 \text{ ms}^{-2}$
- Q.142** A Force of 12N gives an object an acceleration of  $4 \text{ m/s}^2$ . The force required to give it an acceleration of  $10 \text{ ms}^{-2}$  is
- a. 15N      b. 25 N  
c. 20 N      d. 30 N
- Q.143** For which of the following angles range is maximum?
- a.  $43^\circ$       b.  $30^\circ$   
c.  $60^\circ$       d.  $15^\circ$
- Q.144** What give the value of a body acceleration?
- a. The area under its displacment graph      b. The gradient of its displacment time graph  
c. The area under its velocity-time graph      d. The gradient of its velocity time graph
- Q.145** Initially four identical uniform block, each of mass  $m$  and thickness  $h$ , are spread on a table,
- 
- How much work is done on the block in stacking them on top of one another?
- a.  $2mgh$       b.  $3mgh$   
c.  $4mgh$       d.  $6mgh$
- Q.146** If 10 kg mass is dropped from a certain height, hits the ground with speed  $10 \text{ ms}^{-1}$ . The height will be
- a. 100 m      b. 50 m  
c. 10 m      d. 5 m
- Q.147** Which of the following quantity can be calculated by multiplying force and velocity?
- a. Acceleration      b. Torque  
c. Power      d. Work
- Q.148** The energy stored in the dam is
- a. Elastic potential energy      b. Electric potenstial energy  
c. Kinetic energy      d. Gravitational potential energy
- Q.149** A car of 1000kg traveling at 20m/sec rounds a curve of radius 100m. find the necessary centripetal force
- a.  $4 \times 10^3 \text{ kg m/s}^2$       b.  $5 \times 10^3 \text{ kg m/s}^2$   
c.  $3 \times 10^3 \text{ kg m/s}^2$       d.  $4.5 \times 10^3 \text{ kg m/s}^2$
- Q.150** Particle is moving in a circle of radius  $r$  with constant angular speed  $\omega$ . Its acceleration, directed towards the centre of the circle is
- a.  $\frac{\omega}{r}$       b.  $\frac{\omega^2}{r}$   
c.  $\omega^2 r$       d.  $\omega r^2$
- Q.151** The angular analogue of linear displacement is called
- a. Angular velocity      b. Angular momentum  
c. Angular displacement      d. Moment of force
- Q.152** The number of revolutions in  $3\pi$  radians
- a. 2      b.  $3/2$   
c. 6      d.  $1/60$
- Q.153** The ratio of the velocities of sound in hydrogen and oxygen at S.T.P is
- a. 16 : 1      b. 8 : 1  
c. 4 : 1      d. 2 : 1



- Q.154 The frequency of the first harmonic of a string stretched between two points is 100 Hz. The frequency of the third overtone is  
 a. 200 Hz  
 c. 400 Hz  
 b. 300 Hz  
 d. 600 Hz
- Q.155 In a stationary wave along a string the strain is  
 a. Zero at nodes  
 c. Maximum at antinodes  
 b. Maximum at nodes  
 d. Constant every where
- Q.156 A train moves with a speed of  $90 \text{ kmh}^{-1}$ , produces sound of 1000 Hz, frequency heard by driver will be  
 a. Same  
 c. Greater  
 b. Less  
 d. Either b or c
- Q.157 A process in which no heat is added to or extracted from the system is called  
 a. Adiabatic process  
 c. Isochoric process  
 b. Isothermal process  
 d. Isobaric process
- Q.158 A gas undergoes the cycle of pressure and volume changes  $W \rightarrow X \rightarrow Y \rightarrow Z \rightarrow W$  shown in the diagram.



- What is the net work done by the gas?  
 a. -600 J  
 c. 0 J  
 b. -200 J  
 d. 200 J
- Q.159 What is the electric potential energy of a  $7 \text{ nC}$  charge that is 2 cm from a  $20 \text{ nC}$  charge?  
 a.  $8 \times 10^{-5} \text{ J}$   
 c.  $6.3 \times 10^{-5} \text{ J}$   
 b.  $7.3 \times 10^{-5} \text{ J}$   
 d.  $4.3 \times 10^{-5} \text{ J}$
- Q.160 What is the potential difference between two points in an electric field if it takes 600J of energy to move a charge of  $2 \text{ C}$  between these two points?  
 a. 300V  
 c. 50V  
 b. 200V  
 d. 100V
- Q.161 The potential difference between two points A and B is  $\Delta V$ . the work done W by the field in moving a charge q from A to B is  
 a.  $W = -q\Delta V$   
 c.  $W = \frac{-\Delta V}{q}$   
 b.  $W = +q\Delta V$   
 d.  $W = \frac{\Delta V}{q}$
- Q.162 In electrically polarized dielectric, the 'centers of charge' of the electrons and the nuclei  
 a. Coincide  
 c. Repel each other  
 b. Do not coincide  
 d. Effect each other
- Q.163 The resistance of a conductor depends on  
 a. The potential difference V between its ends  
 b. The current I flowing through it  
 c. The current I flowing through it  
 d. The nature, dimension and physical state of the conductor
- Q.164 A wire of uniform cross section A, length L and resistance R is cut into two equal parts. The resistivity of each part is  
 a. Doubled  
 c. Remains the same  
 b. Is halved  
 d. Is one-fourth
- Q.165 There are three bulbs of 60W, 100W and 200W which bulb has thickest filament.  
 a. 100W  
 c. 60W  
 b. 200W  
 d. All of these
- Q.166 Internal resistance is the resistance offered by  
 a. Source of e.m.f  
 c. Resistor  
 b. Conductor  
 d. Capacitor





- Q.167** A charged particle of mass  $m$  and charge  $q$  travels on a circular path of radius  $r$  that is perpendicular to the magnetic field  $B$ . The time taken by the particle to complete one revolution is
- a.  $\frac{2\pi q^2 B}{m}$       b.  $\frac{2\pi m}{qB}$   
c.  $\frac{2\pi M}{qB}$       d.  $\frac{2\pi qB}{m}$
- Q.168** The momentum of a fast-moving charged particle can be determined by from the radius of its trajectory in a
- a. uniform magnetic field      b. strong magnetic field  
c. non-uniform magnetic field      d. weak magnetic field
- Q.169** The direction of induced current in a coil or circuit is such that it opposes the very cause of its production. This law is given by
- a. Faraday      b. Kirchhoff  
c. Lenz      d. Ampere
- Q.170** A transformer is used to
- a. Convert DC into AC      b. Convert AC into DC  
c. Obtain the required DC voltage      d. Obtain the required AC voltage
- Q.171** When a coil of cross-sectional area  $A$  and number of turns  $N$  is rotated in a uniform magnetic field  $B$  with angular velocity  $\omega$ , then the maximum emf induced in the coil will be
- a.  $BNA$       b.  $\frac{BA\omega}{N}$   
c.  $BNA\omega$       d. Zero
- Q.172** The coils of a step-down transformer have 500 and 5000 turns. In the primary coil an AC of 4 A at 2200 volts is sent. The value of the current and potential difference in the secondary will be.
- a. 20 A, 22V      b. 0.4 A, 22000 A  
c. 40 A, 220V      d. 40 A, 22000V
- Q.173** The number of diodes used centre taped transformer
- a. 2      b. 3  
c. 4      d. 1
- Q.174** During the interval  $0 \rightarrow \frac{T}{2}$  the forward biased diode offers
- a. Very small resistance      b. Very high resistance  
c. Very small current flow through it      d. Zero resistance
- Q.175** Find the wavelength of 100 eV electron
- a.  $1.227 \text{ \AA}$       b.  $1.72 \text{ \AA}$   
c.  $1.24 \text{ nm}$       d.  $12.4 \text{ nm}$
- Q.176** Radiation and matter exhibit \_\_\_\_\_ like properties
- a. Wave      b. Particle  
c. Both wave and particle      d. None of these
- Q.177** When electron jumps from  $n^{\text{th}}$  to the  $p^{\text{th}}$  orbit in an hydrogen atom then the wavelength of the emitted radiation is given by
- a.  $\frac{1}{\lambda} = R_H \left[ \frac{1}{p^2} - \frac{1}{n^2} \right]$       b.  $\frac{1}{\lambda} = \frac{1}{R_H} \left[ \frac{1}{p^2} - \frac{1}{n^2} \right]$   
c.  $\frac{1}{\lambda} = R_H \left[ \frac{1}{n^2} - \frac{1}{p^2} \right]$       d.  $\frac{1}{\lambda} = \frac{1}{R_H} \left[ \frac{1}{4^2} - \frac{1}{n^2} \right]$
- Q.178** The half life of radium is 1600 years. The fraction of radium atoms that remain undecayed after 4800 years will be
- a.  $\frac{1}{4}$       b.  $\frac{1}{16}$   
c.  $\frac{1}{8}$       d.  $\frac{1}{32}$





**Q.179** A nucleus of the nuclide  ${}_{94}\text{Pu}^{241}$  decay by emission of a  $\beta$ -particle followed by the emission of an  $\alpha$ -particle. Which of the nuclides shown is formed?

- a.  ${}_{93}^{239}\text{Np}$                       b.  ${}_{91}^{239}\text{Pa}$   
c.  ${}_{93}^{237}\text{Np}$                       d.  ${}_{92}^{237}\text{U}$

**Q.180** How many neutrons are there in the nuclide  ${}_{30}^{66}\text{Zn}$ ?

- a. 25                                  b. 30  
c. 36                                  d. 66

## ENGLISH

### Directions:

In the following sentences, some segments of each sentence are underlined. Your task is to identify that underlined segment of the sentence, which contains the mistake that needs to be corrected.

**Q.181** One of the winners who is eligible to receive the award is here.

- a.                      b.                      c.                      d.

**Q.182** He was recalled by the air force and become one of the first seven astronauts selected for the space programme.

- a.                      b.                      c.                      d.

**Q.183** I had so many jobs to do as I had to stay up all night to finish them.

- a.                      b.                      c.                      d.

**Q.184** There are over a hundred pupils in the sixth form, and the cleverest go on to the university.

- a.                      b.                      c.                      d.

**Q.185** The accident happened to him in a late hour and in an out-of-the-way place.

- a.                      b.                      c.                      d.

**Q.186** They laughed at his warnings and objected to all his proposals. Choose the correct Passive.

- a. His warnings were laughed and all his proposals were objected by them.  
b. His warnings were laughed at and were objected all his proposals to by them.  
c. His warnings were laughed and were objected all his proposals by them.  
d. His warnings were laughed at and all his proposals were objected to by them.

**Q.187** He said, "What a pity you did not come!" Choose the correct Indirect.

- a. He exclaimed that it was a great pity I had not come.  
b. He exclaimed a great pity that I had not come.  
c. He exclaimed with sorrow that it was a great pity I had not come.  
d. He exclaimed that I had not come.

### Directions:

In each question in the following, four alternative sentences are given. Choose the CORRECT one and fill the circle corresponding to that letter in the answer sheet.

**Q.188**

- a. Ted and Janice, who had been friends for years, went on vacation together every summer.  
b. Ted and Janice, who had been friends for years, went on vacation together, every summer.  
c. Ted, and Janice who had been friends for years, went on vacation together every summer.  
d. Ted and Janice who had been friends for years went on vacation together every summer.

**Q.189**

- a. It is important that they would be aware of the provisions of the act.  
b. It is important that they had to be aware of the provisions of the act.  
c. It is important that they must be aware of the provisions of the act.  
d. It is important that they be aware of the provisions of the act.

**Q.190**

- a. What a crowd of emotions clung with him as to their last home before annihilation.  
b. What a crowd of emotions clung to him as to their last home before annihilation.  
c. What a crowd of emotions clung about him as to their last home before annihilation.  
d. What a crowd of emotions clung against him as to their last home before annihilation.

**Q.191** She has such small feet that she has to wear children's shoes. Identify the Sentence.

- a. Simple                                  b. Compound  
c. Complex                              d. Compound Complex



- Q.192 We'll paint the walls pale green. Name the function of the underlined phrase.  
a. Object  
b. Adjunct  
c. Subject Complement  
d. Object Complement
- Q.193 He was extra polite to his superiors lest something adverse should be written into his records. Name the Underlined Clause.  
a. Adverb Clause of Result  
b. Adverb Clause of Reason  
c. Adverb Clause of Purpose  
d. Adverb Clause of Condition
- Q.194 I have done that much only. Identify the Part of Speech of the Underlined Word.  
a. Conjunction  
b. Adverb  
c. Pronoun  
d. Adjective

**Directions:**

Choose the right option to complete the following sentences.

- Q.195 He has a terrible voice; \_\_\_\_\_, he will go down in history as the worst singer ever.  
a. Otherwise  
b. Still  
c. Undoubtedly  
d. Moreover
- Q.196 She felt she could trust him and he \_\_\_\_\_ that feeling by being trustworthy.  
a. Quenched  
b. Mustered  
c. Persisted  
d. Reinforced
- Q.197 What is the Synonym of "OPERATION"?  
a. Campaign  
b. Torpidity  
c. Stagnation  
d. Solemnity
- Q.198 What is the Synonym of "KINDRED"?  
a. Affiliated  
b. Antagonistic  
c. Adversary  
d. Inhospitable
- Q.199 What is the Antonym of "MEAN"?  
a. Shroud  
b. Infer  
c. Cloak  
d. Imply
- Q.200 What is the Antonym of "CURIOUS"?  
a. Inquisitive  
b. Snooping  
c. Apathetic  
d. Erratic